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Gold-coated pacemaker implantation for a patient with type IV allergy to titanium

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ABSTRACT

A 65-year-old man was scheduled for pacemaker implantation for symptomatic sick-sinus-syndrome (SSS). He suffered from multiple drug-allergies and allergies to several metals like quicksilver and titanium. Gold-coated pacemaker generators and polyurethane leads are effective in avoiding allergic reactions to pacing system components. Therefore, we decided to implant a custom-made gold-coated DDDR-pacemaker generator and polyurethane leads.

Introduction

Allergy to titanium is a very rare allergy in the field of type IV allergic reactions. However, for patients who are in the need for device therapy, it can be a serious condition, leading to repetitive strong inflammatory reactions of the pacemaker pocket. We report on a patient with severe SSS and a positive allergy test to titanium, in whom a custom-made gold-coated pacemaker was successfully implanted.

Case report

An 65-year-old man with repetitive loss of consciousness was referred for further examination to our institution. A 24-h-ECG showed two symptomatic (dizziness) episodes of sinus-arrest for 10 s with no escape rhythm as well as a period of sinus-bradycardia with 30 beats per minute during daytime. The patient suffered from a severe SSS resulting in a class Ia indication for pacemaker implantation.

In addition, history revealed multiple allergic reactions to drugs and several metals. Therefore, the patient had undergone dermatologic skin patch testing with the result of a proven type IV allergy to titanium months before the SSS became symptomatic. Considering this condition, we decided to implant a custom-made gold-coated DDDR pacemaker (Medtronic Adapta®DR PVV, 24 carat gold, minimal coating thickness 0.45 μm). The company Medtronic INC is the only manufacturer in the world who offers custom-made gold-coated pacemakers. In our case, it took about 6 weeks to approve the request, produce and ship the pacemaker to our institution. Of note, the price of the custom-made device was the same as of a regular DDDR pacemaker.

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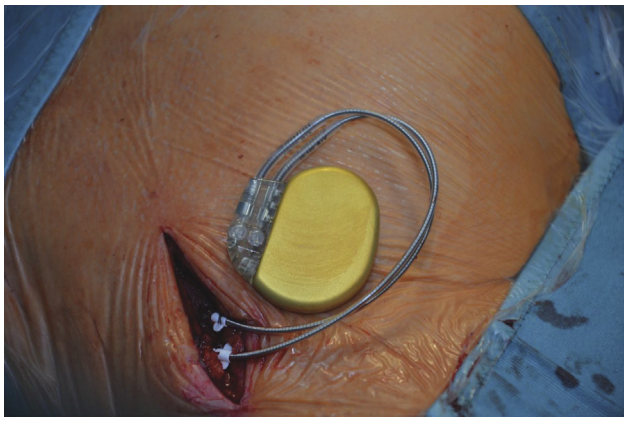

Fig. 1 – Intraoperative photograph shows gold coated pacemaker.

The gold-coated generator (Fig. 1) was implanted subcutaneously in the right chest wall. As leads, polyurethane leads (Medtronic Capsurefix Novus®52 cm/58 cm) were used. The sleeves and the lead-connector of the generator were made of silicone. The two leads were implanted via the right subclavian vein. The implantation procedure was uneventful and wound healing was normal. After two days, the patient could be discharged home in good conditions. Follow-up after six weeks revealed no adverse events related to the pacemaker implantation. All pacemaker systems values remained stable within the recommended ranges.

Discussion

Type IV allergic reaction to titanium in patients in need for pacemaker therapy is a rare problem with very few published reports [1–5]. Severe inflammatory reactions with fluid excretion and wound dehiscence in the pacemaker pocket can occur, leading to the necessity of a complete system removal. Positive skin patch testing to titanium, as in our patient, is highly suggestive of real Type IV allergy.

Titanium belongs to the transition metals and has a low density but high strength. It is highly resistant to corrosion, especially in sea water and chlorine. It is generally well tolerated and therefore an ideal material for medical implants with a widespread application.

In case of type IV allergic reactions to titanium, corticosteroids locally disposed, may reduce skin symptoms. However, after stopping this kind of treatment, recurrence is the rule. In consequence, the only option for patients with titanium allergy and pacemaker dependance is to remove all system components and to implant a pacemaker system with a hypoallergenic surface like a gold-coated generator and polyurethane leads. Using this kind of custom-made device, the patient did not experience any inflammatory reaction during the follow-up period of 3 months.

As an allergic disposition is not always known at the time of implantation, allergic reactions can occur early or late after the procedure. A change in wound condition after the implant-procedure can be the first symptom of type IV allergy to titanium, especially when no signs or prove of infection can be found.

Conflict of interest

Alexander Kypta: none, Hermann Blessberger: none, Michael Lichtenauer: none, Thomas Lambert: none, Juergen Kammler: none, Clemens Steinwender: none.

Statement of contribution

Alexander Kypta drafted the manuscript, Hermann Blessberger drafted the manuscript, Michael Lichtenauer picture processing, Thomas Lambert pubmed review, Clemens Steinwender reviewed the manuscript.

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